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### Development of Anatomy (*Rachana Sharir*)- View of Student

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#### ABSTRACT

Studying the way human body is made of has always been interesting and fascinating. The word Anatomy is derived from a Greek word “Anatome” meaning “to cut up” or “to cut repeatedly”. It is the study of structures that make up the body and how those structures relate with each other. Anatomy is no doubt the foundation of the vast medical field that exists today. Its course had been developed from different corners of the world and today it stands as the foremost branch of the medical field. The knowledge of anatomy is the essential part for all the fields of medical. Hindus are considered as the foremost cultivators of this department. India being one of the oldest civilizations has significant contribution to our human anatomy. Acharya Sushruta, in Sushruta Samhita firstly mentioned about human dissection and many other embryological and anatomical concepts. Later on several great anatomists contributed their well versed discoveries of the structures of complex human body with proper dissection earlier on animals but later finally on human cadavers.

#### KEYWORDS

*Anatomy, Sushruta, Dissection*



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## INTRODUCTION

The Human Anatomy (Rachana Sharir) is important for all allied health sciences. It is one of the fundamental subject in the health science. The ayurvedic life science is also based on human anatomy and physiology (Rachana & Kriya Sharir), without the knowledge of Rachana Sharir and Kriya Sharir, the physician cannot become perfect in the profession. So the ancient Acharya like Sushruta, Charaka and Vagbhata have given importance to the knowledge of Rachana Sharir. The need of human anatomy is very essential to the students of ayurvedic undergraduates and it has to be taught in a proper curriculum so that it gives them proper knowledge to build up a fundamental concept related to the human body.

## AIM

To study the history of Anatomy (Rachana Sharir).

## OBJECTIVES

1. To study the status of anatomy (Rachana Sharir) with ancient prospective.
2. To establish the opinion for studying Rachana Sharir (Anatomy) for ayurveda scholars.
3. To define the development of observational anatomical study since its beginning.

4. To study the contribution of Rachana Sharir in modern anatomy.

## LITERARY REVIEW

**PRE-VEDIC PERIOD:** It is the period around 3000 BC when Indus Valley Civilization was developing. That period's archaeological excavations showed the paintings depicting the animal pictures which had certain parts marked. These parts were those which when hit killed the animals. This way they showed the knowledge they had of the comparative anatomy<sup>1</sup>.

**VEDIC PERIOD:** This was 1500 BC period when the four Vedas were rendered by Vedavyasa. These were Rigveda, Yajurveda, Samveda and Atharvaveda. Ayurveda, the Indian science is mentioned in the fourth veda.

Description of anatomy in Atharvaveda<sup>2,3</sup> -

1. Referred heart as lotus bud with 9 gates.
2. The concepts of dhamni, sira and snayu.
3. Description of the organs of the body in a systematic manner while discussing about the Yaksma and its management.
4. Hridaya (Heart) has been mentioned and its connection with Manas and Chitta has also been referred in Atharvaveda.



5. Srotas, Nadi, Saptadhatu, Ojas, Mastishka and 360 asthi .

Most of the terms coined by Atharvaveda for the parts of the body have been adopted in later Indian medical classics i.e. CharakaSamhita, Susruta Samhita and Astanga Hridaya Samhita.

EGYPT: Ebers Papyrus described that there are 52 “metu” which may referred to tendons or vessels or may be nerves too. Edwin Smith Papyrus shows the first use of the word “*neuro*” and information on the meninges and cerebrospinal fluid<sup>4</sup>.

GREECE: The development of anatomy started in Greece. Though it was targeted on animal anatomy as religious sentiments didn't allowed the human dissection after death. They believed that the dead man is aware of the things going around hence should be buried undisturbed in coffin<sup>5</sup>.

Alcmaeon (500 B.C.) of Crotona in Italy was the first to describe and locate the optic nerve and eustachian tube, and he is also given the credit for proposing that the brain is the seat of consciousness, intelligence and emotions<sup>5</sup>.

Hippocrates II<sup>5</sup> (460-370 BC) was the first to write about human anatomy without any dissections. Hippocratic books contained anatomical factual passages that were based on the skeletal inspection and living body observations. He developed certain observations on osteology. He

demonstrated the sutures of the cranium and also the shape of the bones which were accurate. But certain major drawbacks were observed in his theories –

1. Brain a gland which exudes a vicid fluid.
2. The arteries were filled with air.
3. The lungs consist of five ash-coloured lobes which are spongy and dry but are refreshed with air inhaled.
4. The kidneys were glands, by virtue of which the moisture of the drink is separated and descends into the bladder.

Aristotle (384-322 BC) studied animals most nearly allied to humans and dissected them to form opinions of the human body on his findings in animals. Major contribution was, he distinguished the thicker and tendinous structure of the aorta from the vein which is thin and membranous. But his observations laid certain concepts which were discarded later – considering ureters as branches of the aorta; nerves arising from heart etc. But he was well versed with the liver, spleen and the whole alimentary canal<sup>5</sup>.

Herophilus<sup>5</sup> (300BC) of Chalcedon (present day Turkey) was a physician, surgeon but majorly THE FATHER OF ANATOMY. He was the first one to dissect the human body and maintained “an anatomy register” for anatomical nomenclature which he developed by



precisely dissecting 600 cadavers. Major contribution of Herophilus includes-

1. The description of arachnoid membranes, the cerebral ventricles,
2. The venous sinuses
3. Nerves- origin, classification into sensory and motor, distinguishing them from tendons and damage of the motor nerves led to paralysis
4. The lacteals
5. Coverings of the eye, liver, uterus, epididymis and many other structures.
6. He gave the name “duodenum”
7. Herophilus also stated that pulse is due to the conduction from the heart not due to any miracle.

Erasistratus (310-250 B.C) was from the Islands of Chios was contemporary of Herophilus. He gave complete anatomical description of heart along with its vessels and even regarded heart as “the pump”. He also contributed to differentiate between cerebrum and cerebellum, described the cerebral convolutions, ventricles, and meninges. He also described function of trachea<sup>5</sup>.

But when the Romans invaded Greece there was a major fall in the developing anatomy as human dissections were again forbidden. This state lasted till the Middle Ages.

INDIA: Two major texts were proposed by the Indian medicine – Charak Samhita and

Sushruta Samhita. Both the texts comprises of different units; one of these is Sharir sthana; which has the detailed description of the human body as per the Indian medicine system. These Indian anatomists divided human body into six parts- the four extremities, the neck and trunk. Both the Acharya described the month wise development of the garbha, number of asthi, sandhi, peshi, sira, snayu, dhamni, srotas, layers of twak, marma etc. They have also described hridaya, amashaya, mastishka and other organs of human body. Acharya Sushruta (6 cent BC) elaborately mentioned the criteria that is to be kept in mind to select the body for preservation and then dissect it for detailed knowledge. He even told the method to preserve the cadaver in his text<sup>6</sup>. Acharya Sushruta had immense knowledge regarding the minute details of the human body and his work is still accepted to the extent that he is known as “The Father of Surgery”.

Acharya Charak (4 cent BC) was more of philosophical in its principles but majorly focused on traditional medicines and hence was called “The Father of Indian Medicine”. Charak Samhita also mentions the Oath of Initiation that is akin to Hippocratic Oath.

ROME: Claudius Galenus<sup>7</sup> (131-192 AD) of Asia Minor was one the most renowned physician of his time. Though his dissection



was limited to animals especially monkeys as they are closely related to the human beings; he gave some major findings in the field of anatomy-

1. Diaphragm isn't the only muscle involved during respiration.
2. Origin and course of phrenic nerve, left laryngeal nerve.
3. Differentiation of pia and dura mater.
4. Description of pineal and pituitary gland.

But considering only 7 cranial nerves and the air enters the blood via left ventricle were his huge errors. The Galenic concepts, both accurate and inaccurate, became canonized as the theoretical basis of medicine and surgery for 15 centuries.

ITALY: In late 13<sup>th</sup> century Mondino de Luzzi<sup>7</sup>, a surgeon-anatomist restarted the dissections but these were still limited to animals. Autopsies were done to find out the cause if foul play was suspected. He produced the first manual for dissection in 1316.

Leonardo da Vinci<sup>8</sup> (1452-1519) was one of the greatest personalities who with his drawings had conquered world. He was an artist, sculptor and engineer. His drawings of muscles, nerves, and vessels reflected the engineer in him. He acquired his first human skull in 1489 but his deepest work was in 1506 when he witnessed a 100 yr old

man's death and then dissected him. He described the coronary sinuses almost 200 years before Valsalva.

Galen work was very well carried forward for years. In 1543, Andreas Vesalius<sup>9</sup>, young Flemish anatomist too favoured Galen till he was at University of Paris. But when he moved to University of Padua he dissected bodies himself and found major errors in Galen's work. Contribution of Vesalius were-

1. Vesalius found that the breastbone was actually 3 segmented which was contrary to Galen's 7 segments.
2. He was the author of one of the most influential books on [human anatomy](#), *De humanicorporisfabrica* (*On the Fabric of the Human Body*).
3. Vesalius also observed mandible single boned which didn't go along with Galen's 2 boned mandible.
4. In year 1543, he dissected publically a human body and took out the skeleton and assembled. He later on submitted it to the University of Basel and is the world's oldest surviving anatomical preparation.
5. Lymphatic system was separately identified system.

William Harvey<sup>10</sup>- In 1628, he published his theories in a book entitled 'Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus' ('An Anatomical Study of the



Motion of the Heart and of the Blood in Animals'), where he explained how the heart circulated the blood in a circular course through the body. He also suggested that the fertilization takes place when egg and sperm fuse together. But it took two centuries for people to actually get this as he could not explain it with full theory and proofs.

The anatomy flourished way beyond in 17<sup>th</sup> and 18<sup>th</sup> centuries as many museums showed the skilled artists work which made other artists to see the dissections and then doing that themselves so that they could also show up their work for money. This increased the demand of corpses.

William Cheselden was the first one to hold the anatomy lectures and dissection classes regularly. The rapid growth of anatomy schools made the entry of the Murder Act which legalised the dissection of the executed criminals for medical education enhancement. This also paved way for the preservation of the cadavers for further use like injecting wax to maintain organ's shape, use of dyes and mercury etc.

**1858:** Henry Gray's Anatomy, Descriptive and Surgical is first published. It soon becomes the foremost anatomical reference text and its descendant is still widely used today.

**1895:** Wilhelm Roentgen demonstrates his new invention, the x-ray, in Wurzburg, Germany.

With time passing by and major growth in science enabled people to develop certain machines which made easy access to the body- living or dead.

In 19<sup>th</sup> century more dissections were carried out that made more precise knowledge of the human body. This made further expansion of anatomy to histology.

**1921:** John Newport Langley gives a detailed description of the structure and function of the autonomic nervous system.

**1952:** Felix Bloch and Edward Purcell receive the Nobel Prize in Physics for their work on magnetic resonance phenomenon, leading to the development of Magnetic Resonance Imaging, or MRI.

**MODERN DAY ANATOMY- 2003:** The Human Genome Project is successful in identifying the approximately 20,000-25,000 genes in human DNA and in determining the sequences of the 3 billion chemical base pairs that comprise it.

## RESULT

Authors are of the opinion that the ancient observation related to Rachana Sharir should be placed in the history of anatomy



and latest modern and updated anatomy should be incorporated in the curriculum.

## CONCLUSION

Humans are evolving and so is science. Science is defined as “the knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method”. The inferences are well observed, experimented, proved and then accepted by the world. Science is never still and limited; but is always evolving and expanding.

Ayurveda on one part is “the science of life” but on the other it is the same today as it was centuries back. The backbone of any field is the way it has been projected now. Ayurveda is learned, taught and carried forward by the same way as it was done by our ancestors. No changes, no additions, no omissions. The science is two way- Principle based and Observational. The principle of science is always constant but the observations are variable with respect to time. The observations that are non-existent in today’s era should be made part of history rather than dragged on and those that are still relevant should be added with proper scientific base. Today, this enriched piece is in major need for research so that the well proven results are shown and

carried forward by the present legacy which will in turn change the view or perception from understanding, treatment and research point of view.





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